

MONTANA

Wildlife



MONTANA FISH AND GAME DEPARTMENT OFFICIAL PUBLICATION

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STATE OF MONTANA

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Montana Fish and Game Commission

February, 1968

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Cover Picture



The little cottontail rabbit is probably the most hunted animal in the United States. He is also an important item on the menu of predators other than man. In spite of this, the cottontail persists in great numbers largely because of his great reproductive potential.

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Editor — Vernon Craig

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WHEN WINTER COMES!

By GENE H. SHERMAN



When winter comes the spectre of starvation stalks the wild. With heavy snow in the high country, game move into lower areas where they may become unwelcome guests of landowners.

Game damage complaints are not new to the Montana Fish and Game Department. Back in March 1939, out-of-season, a Mr. Rathbone killed a wild elk on his ranch. He called the Montana Fish and Game Department and asked them what they wanted to do with it. Mr. Rathbone contended that the elk was doing damage to his property. A game warden went to investigate, found the dead animal, arrested the rancher, and a trial in district court followed. The trial judge ruled that the rancher could not show the necessity of defense of his property to justify him to shoot the elk. A verdict of guilty was returned by the jury. After his conviction, Mr. Rathbone appealed his case to the Supreme Court of Montana.

The Supreme Court reviewed the case and in essence held that there were points in favor of the defendant as well as the State Fish and Game Department. They submitted a few new rules concerning game damage;

then returned the case to the trial court for a new trial.

A new trial was never ordered, but the guide lines set down by the Supreme Court are still being used by the Montana Fish and Game Department in adjudging game damage.

In ruling upon this appeal, the Montana Supreme Court revealed a fine appreciation of the conflict between the right of the state to preserve its game animals, as opposed to the citizen's right to defend his property.

The court stated:

"These constitutional provisions enunciate natural, fundamental, and inalienable rights enjoyed and guaranteed to every person residing within the state of Montana. They are absolute and self-executing insofar as they limit the power of the legislature to restrict these rights of the people. If the pleas of justification for the killing of an elk or other destructive wild animal cannot be relied upon

by a defendant in an action charging him with such killing, the constitutional provisions referred to become a nullity. If one may kill a human being or attack him in defense of his property, it would be an unreasonable doctrine to hold that the right of defense of property as justification for the killing of wild beasts of the field and the forest does not exist. Legal justification may always be interposed as a defense by a person charged with killing a wild animal contrary to law."

The court then went on to develop more specific rules relating to the right to kill wild animals in defense of one's property. It said, "Justification cannot be based upon a mere trespass by wild animals. Montana is one of the few areas in the nation where wild game abounds. It is regarded as one of the greatest of the state's natural resources, as well as the chief attraction for visitors. Wild game existed here long before the coming of man. One who acquires property in Montana does so with notice and knowledge of the presence of wild game and presumably is cognizant of its natural habits.

Pointing out that wild game cannot distinguish between wild forage and cultivated crops, the court continued: "Accordingly, a property owner in the state must recognize the fact that there may be some injury to property or inconvenience from wild game for which there is no recourse."

The Rathbone case is one of consequence and serves as a valuable guideline when evaluating damage complaints arising from the use of private property by wild animals.

The Montana Fish and Game Department spends several thousand dollars each year on game damage in order to provide sportsmen with as many game animals as possible and, on the other hand, prevent ranchers from suffering any unreasonable damage by wild animals. Game management attempts to keep game herds in harmony with available forage, but deep snow and cold weather combined with local conditions make exceptions to the best laid plans.

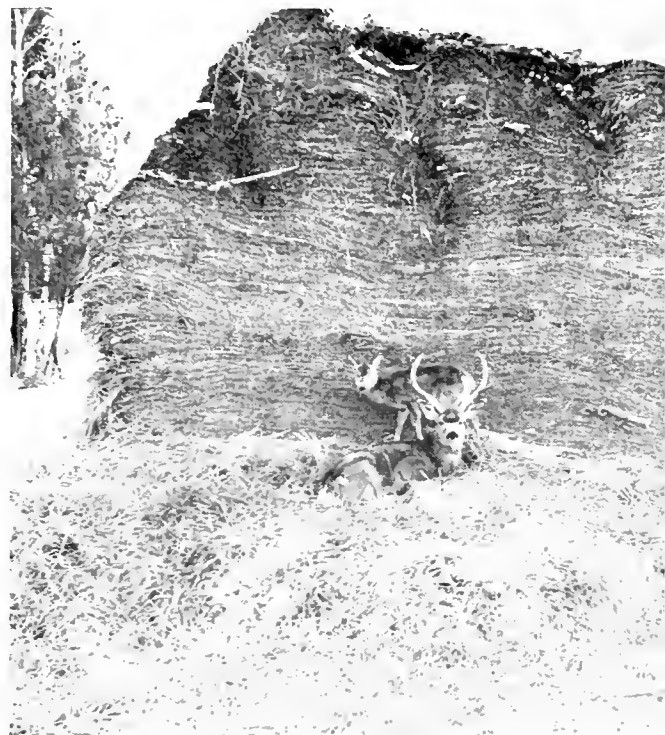
The game picture is a lot different in the winter than it is in the summer and fall. The Fish and Game Department conducts "show-me" trips for the sportsmen so that they may see the winter picture of the game animals. When large herds of deer and elk are shown

to the sportsmen on their winter ranges, the question which often follows is, "Where did they come from?" The disgruntled hunter says, "I huted all fall without even seeing a fresh track."

The answer in most instances is that the game came from the high country. Deep snow and cold weather has forced them to lower country in search of food. It is during the cold winter months that the rancher also wants to know where they came from, and many times he asks another question. "What are you going to do with them?" This question usually poses a real problem, because it is difficult to do very much with game animals when the weather is cold, when the snow is deep, and when the animals are hungry. A hungry animal loses much of its fear of man. But with all these adversities, fish and game people attempt to alleviate these complaints. It is worthy of mention that most ranchers are quite tolerant of game animals in the winter time.

Game damage may be of a minor nature causing only a nuisance factor, or it may be a major factor causing an individual rancher

The buck that wasn't found by hunters last fall. Deer damage is generally not as serious as that caused by their larger relatives—the elk.



considerable loss in hay and feed, which in turn, would cost him many dollars to replace.

The complaints the game wardens receive vary from the gardener who has a deer or two nibbling on his roses to the rancher who says he has a hundred head of elk tearing down his fences and destroying his haystacks.

Regardless of the seriousness of these complaints, they must be investigated, and steps must be taken to alleviate as much damage as possible in the shortest time possible.

When game animals are forced to look for food in the ranchers haystacks, it would be a simple solution to kill them and thus give the rancher permanent relief from any damage, but the Montana Fish and Game Commission has a responsibility to the people to protect these animals. They believe that game animals like bad boys deserve another chance, so they exhaust all means within their power and financial limitations to alleviate game damage, by other means. Destroying these animals by the use of special kill permits are used only as a last resort when no other means seem applicable to the particular situation.

Alleviating game damage seems to be a way of life with many ranchers, and each has his own way of approaching the problem. For example, some ranchers who live near the mountains in the foothill areas expect some game to winter near their feed lots so they plan ahead. They not only build a fence around their stacks, usually made of lumber panels, which will keep the game out. When these precautions are planned and carried out early in the fall, the Fish and Game Department seldom hears from them. They seem to have found a way to live with the game animals and enjoy seeing them around. This is the best solution in preventing game damage and also the most satisfying.

The rancher of the other extreme will not fence his stacks from game nor his own domestic livestock, and when his cattle get into his hay, he calls the warden and blames the damage on the elk or deer.

Somewhere in between these examples is where the Fish and Game Department spends many dollars trying to keep good relationships with the ranchers who have a reasonable complaint against game damage, and yet protects the game for the people.

Some methods the department uses to ease the tension caused by game damage follows:

Deer Repellant

Since 1955, the Fish and Game Department has been buying a deer repellant which has proved quite satisfactory in preventing certain kinds of deer damage. This repellant has a brand name of Neochem Deer Repellant.

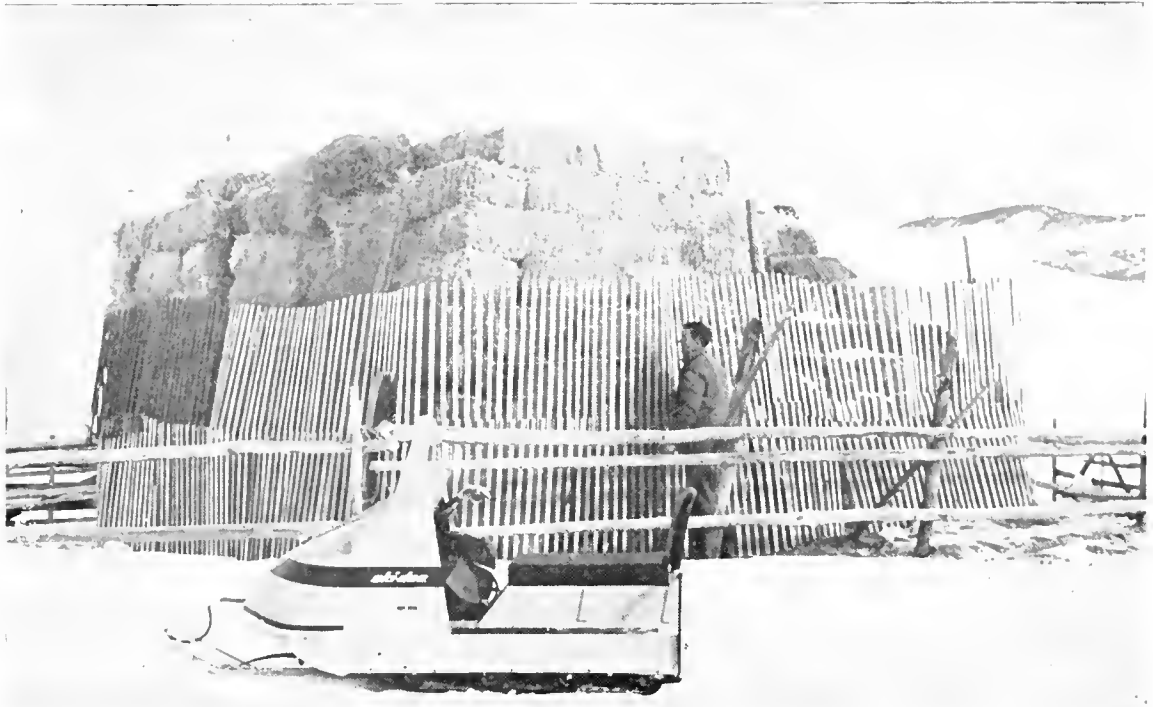
It is a water emulsifiable concentrate containing bone tar oil specifically formulated for control of damage to trees and shrubs by deer. It is an odor repellant designed to prevent pawing and antler rubbing. This product, used by the department since 1955, has shown no toxic effects to either game or livestock and has proved to be an economical way to prevent game damage in many situations. Neochem has given the most satisfying results on baled haystacks that were sprayed early in the fall before the game moved into the area. It is not fool proof but in many instances has prevented stack damage by deer, elk and moose. It does not work well on stacks built of loose hay, nor is it very effective if applied after the animals have started using the stack. Tests have shown that cattle clean up the sprayed bales as well as the unsprayed, even when all six exposed sides of the bale have been sprayed. Normal spraying of haystack covers only one side of the bale, except on corners where one side and one end may be covered.

Fencing

In certain cases, the Fish and Game Department has assisted ranchers in fencing some stacks by providing snow fence or paneling. This is an expensive method and any large scale program of this nature is prohibitive because of the cost. This method has mainly been used in hardship cases and usually only after the damage has begun. In most cases the rancher has lost more value in hay than the original fencing would have cost him had the work been done early in the fall when the roads were dry and free from snow. The cost sometimes more than doubles when material is hauled to stack-yards in the winter. In some instances, it is impossible to get material to the stacks. In these cases other methods are tried.

Herding

Herding is another expensive way to prevent game damage. In cases where the weather



Warden Erwin Kent inspects a snow fence barrier to see if elk have been kept from baled hay.

becomes severe and extensive game damage is prevalent, the department has hired a herder who usually works at night in an attempt to keep game animals from haystacks and excessive use of private pasture. This method usually only lasts through the duration of a storm. When the weather improves, the animals are herded back to the higher country.

Hazing

Temporary relief from game damage has been achieved by herding game animals away from damage areas by using an airplane or helicopter. This method has been used primarily to alleviate immediate damage by antelope or elk until some other method could be employed which would provide a more lasting solution to the game damage problem.

Kill Permits

Montana law grants the Fish and Game Commission the authority to grant permission to property owners suffering game damage to kill a specified number of animals that are causing the damage. As a matter of policy the commission issues these permits only when other methods of alleviating game damage are not feasible and then only for a very minimum number of animals.

Summary

Game damage complaints are placed in the hands of the Montana Fish and Game wardens. It is one of their responsibilities to investigate the complaint and make a recommendation to alleviate the damage in the most economical and feasible manner possible. Most of the methods used will only give temporary relief at best to the rancher. The best solution to excessive game damage is to manage the game herds so that they are compatible with their range and other land uses.

In many areas, the question is not how much game the department can raise, but how much game can the rancher afford to tolerate. Game management considers this point when seasons are set so that hunters may harvest the surplus animals. Quite often when the general hunting seasons fail to attain this goal, the commission sets special hunting seasons in local areas as a further attempt to obtain this objective.

There will probably always be some game damage complaints as long as there is any game, but the goal of the department is to manage the state's game animals so that in general they will be in harmony with other uses of the land.

FOR VARIETY FISHING

By GEORGE D. HOLTON
Chief Fisheries Biologist

Montana has a goodly variety of fish to tempt the fastidious angler. Nineteen different *game fish* swim in waters of the state. These were designated game fish by the Montana Legislature. Trout, whitefish, and sauger are examples, as are paddlefish, the most recent addition to the game fish list. Apart from the game fish there are 11 sport fish species in Montana waters—such as catfish, crappie and perch. These are not officially game fish but nevertheless are popular with fishermen.

Much has been written in our department publications about the more abundant and widespread species such as rainbow and brown trout. So, for the fishermen who like a variety of fish in their creels, here is a bit of information on some game fish less familiar to Montana anglers; northern pike, lake trout, golden trout, Arctic grayling, largemouth bass, kokanee, sauger and walleye. The lists of waters in which these fish can be found have been furnished by Fish and Game Department district fisheries managers.



NORTHERN PIKE (*Esox lucius*), locally referred to as "northern."

The northern pike is the only member of the pike family in Montana. It has an elongated body with a single fin on the back placed far to the rear near the tail. The head is long. The snout is flattened, projected like a duck's bill and full of sharp teeth. The body is bluish-or greenish-gray with a white belly. There are numerous pale spots in irregular rows along the entire body.

These fish characteristically inhabit the shallow water of lakes and do best in lakes with extensive weed beds. An amply supply of forage fish is a "must" as pike are voracious eaters. Spawning takes place during high water soon after the ice goes off in the spring.

Northern pike are native to the northern parts of North America and Eurasia. According to Dr. C. J. D. Brown of Montana State University, it is possible they are native in Montana, but only in the St. Mary Drainage. They have been introduced elsewhere in the state. Presently the best catches of large northern pike—up to 25 pounds—are made in Fort Peck Reservoir near Rock Creek State Park.

Unfortunately, illegal introductions of northern pike have been made into several waters of the state. This fish does poorly unless its specific habit requirements are met, and at the same time it is a particular threat to trout waters due to its predatory habits.

NORTHERN PIKE WATERS

Northwestern Montana

Lonepine Reservoir.....Near Hot Springs
Loon Lake.....Between Kalispell & Libby
Little Bitterroot River West of Flathead Lake
Flathead RiverBelow Kerr Dam

Echo Lake.....Near Creston
Missouri River below
Morony Dam.....Near Great Falls
Pishkun ReservoirNear Choteau
Split Rock Lake.....Near Choteau

Arod Lake.....	Near Brady
Lake Francis.....	Near Valier
Marias River below Tiber Reservoir.....	Near Cut Bank
Pike Lake.....	Near Babb

Northeastern Montana

Dredge Cut Ponds.....	Near Fort Peck
Fort Peck Reservoir.....	Fort Peck
McChesney Reservoir (Rock Creek Reservoir).....	Near James Kipp State Park
Fresno Reservoir.....	Near Havre
Milk River (including small irrigation diver- sion dams—sparse population)	

Northeastern Montana

Nelson Reservoir (sparse population).....	Near Malta
McNeil Slough.....	Near Saco
Killenbeck Reservoir.....	Near Four Buttes
Raymond Reservoir.....	Near Raymond

Southeastern Montana

Tongue River Reservoir.....	Near Decker
Westrope Reservoir (Sportsmens Reservoir).....	Near Baker
Johnson's Reservoir.....	Near Lindsay
Several small reservoirs throughout south- eastern Montana	

LAKE TROUT (*Salvelinus namaycush*), also known as Mackinaw trout.

This is our largest trout. Twenty-pounders are considered "bragging size" in Montana; thirty-two pound lake trout have been caught from Flathead Lake. The background color of the body is usually dark gray. The body, except for the belly, has pale spots. The tail is deeply forked.

Lake trout generally live in the deeper parts of clear lakes where fishermen seek them with large spinners and weighted lines. They are fall spawners. Unlike other trout they do not construct a nest but spawn on loose rock or ledges on the lake bottom. The main diet of adults is fish.

Lake trout are found naturally only in northern North America. Investigations by Dr. Robert E. Vincent indicate that in Montana they are native in Elk Lake in the Beaverhead River Drainage and in Twin Lakes (actually one lake shaped like an hourglass) in the Big Hole River Drainage. They are also native in Glacier National Park in Chief Mountain Lake (now named Waterton Lake) and St. Mary Lake, both portions of upper Saskatchewan River Drainage.

LAKE TROUT WATERS

Northwestern Montana

McDonald Lake.....	Glacier Park
Waterton Lake.....	Glacier Park
Lake Blaine.....	Near Kalispell
Flathead Lake.....	Near Kalispell
McGregor Lake.....	Between Kalispell & Libby
Spar Lake.....	Near Troy
Whitefish Lake.....	Near Whitefish
Upper & Lower St. Mary Lakes.....	Near Babb

Southwestern Montana

Elk Lake.....	Near West Yellowstone
Twin Lakes.....	Near Wisdom

Southeastern Montana

Yellowtail Reservoir.....	Near Hardin
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GOLDEN TROUT (*Salmo aquabonita*)

This could be considered Montana's most colorful fish. They look somewhat like a rainbow trout but are more brilliantly marked. Typically, the upper sides are yellowish-olive, there is a red band along the lateral line, the lower sides are yellow and the belly is red. There are round black spots across the upper third of the body and numerous spots on the dorsal fin and tail. Some fins are tipped with white. Parr marks (dark marks on the sides) are retained by the adults.

Originally golden trout were found only in a few high altitude streams in the Kern River Drainage, California; however, they have been planted in high mountain lakes in several western states. They spawn in late June and July. Although most trout spawn in the inlets to lakes, goldens will spawn in the outlets as well. When reared at lower elevations, they tend to become drab in appearance. They are close relatives of rainbow trout.

GOLDEN TROUT WATERS

Northwestern Montana

Imagine Lake.....Near Thompson Falls
 Herrig Lake.....Near Stryker
 Jim Creek Lakes, Heart Lake, Island Lake
 & Crescent Lake.....Near Condon

Southwestern Montana

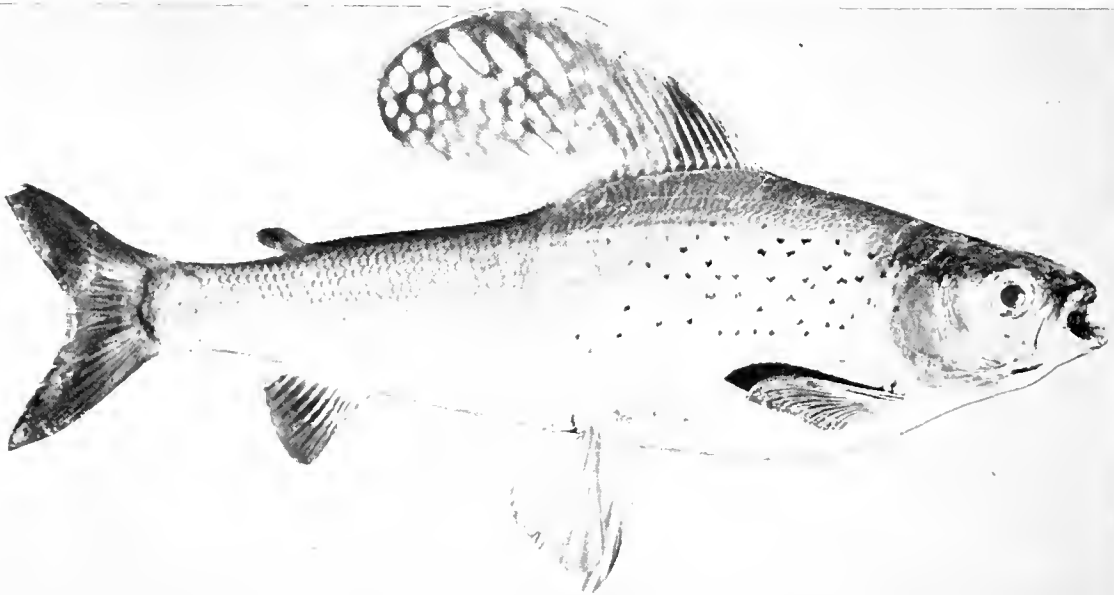
Romona Lake.....Near West Yellowstone
 Avalanche Lake &
 Blue Danube Lake.....Near Quake Lake
 Mary Lou Lake.....Near Whitehall
 Golden Trout Lake &
 Hidden Lake.....Near Gallatin Gateway
 Falls Lake &
 West Boulder Lake.....Near Emigrant

Southcentral Montana

Big Park Lake &
 Cairn Lake.....Near Cooke City
 Dewey Lake &
 Duggan Lake.....Near Cooke City
 Fossil Lake &
 Golden Lake.....Near Cooke City
 Hidden Lake &
 Jasper Lake.....Near Cooke City
 Lake at Falls Lake &
 Lake of the Winds.....Near Cooke City
 Medicine Lake &
 Rainbow Lake.....Near Cooke City
 Sylvan Lake.....Near Red Lodge

Central Montana

Rhoda Lake.....Near Neihart



ARCTIC GRAYLING (*Thymallus arcticus*). Formerly Montana grayling were listed as a separate species, but now all North American grayling are considered to be Arctic grayling.

A member of the salmon family, the Arctic grayling is readily distinguished by its extra large, colorful dorsal fin. Simon in WYOMING FISHES calls it "Lady of the Waters." The body is generally purplish-gray and silver with small irregular black spots concentrated on the front half. It has an adipose fin (small fatty fin on the back just ahead of tail) and scales that are large compared to those of a trout. The usually grayling in Montana weighs less than a pound.

Arctic grayling are widely distributed across Canada, Alaska and Siberia. They were once abundant in Michigan but became extinct in the 1930's. In Montana they were mainly stream-dwelling fish. Their original distribution was in the Missouri River Drainage above Great Falls, and in the Sun and Smith rivers, tributaries of the Missouri below Great Falls. The water areas in the state where they are found has been greatly reduced due to introductions of other fish and man-made changes in habitat. At the same time their range has been somewhat extended as they have been introduced into lakes on both sides of the Continental Divide. They spawn in streams in the spring and do not prepare nests but spawn over gravel or coarse sand.

ARCTIC GRAYLING WATERS

Northwestern Montana

Elizabeth Lake &	
Kintla Lake.....	Glacier Park
Fishtrap Lake.....	Near Thompson Falls
LaSalle Ponds.....	Near Kalispell
Sylvia Lake, Lone Lake	
& Lake Monroe.....	West of Kalispell
Handkerchief Lake &	
Graves Creek.....	Near Bigfork
Half Moon Lake.....	Near Coram
Lake Five.....	Near Coram
Red Meadow Lake.....	Near Olney
Cyclone Lake.....	Near Whitefish
Hungry Horse	
Reservoir.....	Near Hungry Horse
Heart Lake.....	Near Lincoln
Harper Lake.....	Near Seeley Lake

Southwestern Montana

Fuse Lake.....	Near Philipsburg
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Grebe Lake, Ice Lake &	
Wolf Lake.....	Yellowstone Park
Red Rock Lakes (upper &	
probably lower).....	Red Rocks Refuge
Red Rock River.....	Red Rocks Refuge
Ennis Lake & Madison River	
(just above and below lake).....	Near Ennis
Lake Agnes.....	Near Glen
Bobcat Lake.....	Near Wise River
Mussigbrod Lake.....	Near Wisdom
Odell Lake.....	Near Wisdom
Pintlar Lake & other lakes	
in vicinity.....	Near Wisdom
Hamby Lake.....	Near Jackson
Schwinegar Lake.....	Near Jackson

Southcentral Montana

Froze-to-Death Lake.....	Near Cooke City
Rough Lake.....	Near Cooke City
Sky Top Lakes (3 lakes).....	Near Cooke City
Turgulse Lake.....	Near Cooke City



LARGEMOUTH BASS (*Micropterus salmoides*)

The largemouth bass is one of the black basses, and a member of the sunfish family. The body is elongated compared to the usual sunfish. The back is dark green and this shades to a greenish-white belly. This fish is characterized by its mouth which extends behind the eye in adults, and also by a dark band extending from head to tail along the mid-line of each side. Five-pounders are considered "bragging size" in Montana.

Largemouth bass do best in shallow, weedy lakes and river backwaters where they eat insects, crayfish, frogs and other fish. Spawning is in late spring or early summer. The male, by fanning, cleans out a nest on the lake bottom. After spawning he defends the nest until the fry emerge from the eggs and he accompanies the school of fry until they are one to two inches long.

Largemouth bass, along with other sunfishes, are exclusively North American fish. Their native range is east of the Rocky Mountains from southern Canada to Florida and northeastern Mexico. They are not native to Montana but according to an early Montana Fish and Game Department Biennial Report were introduced into Lake Sewell in 1902. Lake Sewell is now covered by Canyon Ferry Reservoir. Although they have been planted extensively in ranch ponds throughout the eastern part of the state, the best largemouth bass fishing in Montana is in lakes and reservoirs west of the Continental Divide.

LARGEMOUTH BASS WATERS

Northwestern Montana

Clark Fork River sloughs.....	Near Noxon
Bull Lake.....	Near Troy
Alvord Lake.....	Near Troy
Murphy Lake.....	Near Eureka
Blanchard Lake.....	Near Whitefish
Whitefish Lake.....	Near Whitefish
Island Lake.....	Between Kalispell & Libby
Loon Lake.....	Between Kalispell & Libby
Thompson Lakes.....	Between Kalispell & Libby
Lake Mary Ronan.....	Near Flathead Lake
Lake Blaine & McGilvray Lake.....	Near Creston
Peterson Lake.....	Near Creston
Potholes.....	Near Creston
Echo Lake.....	Near Bigfork
Flathead Lake (East Bay).....	Near Polson
Pablo Reservoir.....	Near Ronan
Ninepipe Reservoir & Kicking Horse Reservoir.....	Near Charlo
Swan Lake (shallow bays).....	Near town of Swan Lake

Metcalf Lake.....	Near town of Swan Lake
Clearwater Lake (Elbow Lake).....	Near town of Seeley Lake
Placid Lake, Salmon Lake & Seeley Lake.....	Near town of Seeley Lake

Westcentral Montana

Tintinger Slough.....	Near Cascade
Bearmouth Slough.....	Near Drummond
Clark Fork River & Bitterroot River sloughs.....	Near Missoula
Frenchtown Gravel Pit.....	Near Frenchtown

Southwestern Montana

Jefferson River Slough.....	Near Three Forks
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Northeastern Montana

McNeil Slough.....	Near Malta
Tolksdorf Reservoir.....	Northwest of Sidney
Larson Reservoir.....	Near Sidney

Southeastern Montana

Tongue River Reservoir.....	Near Decker
Numerous ranch ponds in southeastern Montana	

KOKANEE (*Oncorhynchus nerka*), sometimes referred to as silver salmon; however, coho salmon are more properly called "silver salmon."

Kokanee are the landlocked form of sockeye salmon—one of the Pacific salmon. Prior to spawning, they are a silvery fish with a bluish cast on the back and head. At spawning both sexes change color. The males turn red and develop a hooked jaw and humped back. The females usually become dark gray. Kokanee mature at three to five years and die after spawning. They spawn in streams and along the shores of lakes. In the past 15 years the length of adults from the Flathead River Drainage has varied from 9 to 17 inches.

Kokanee were originally found on the west coast from Oregon to Alaska and inland as far as Idaho. According to Montana Fish and Game Department Biennial Reports, they were introduced into Flathead Lake in 1914.

KOKANEE WATERS

Northwestern Montana

Bowman Lake & Kintla Lake.....	Glacier Park
McDonald Lake.....	Glacier Park
Josephine Lake.....	Glacier Park
Swift Current Lake.....	Glacier Park
Ashley Lake.....	Near Kalispell
Flathead Lake (& tributaries when spawning).....	Near Kalispell
Lake Mary Ronan.....	Near Flathead Lake
Swan Lake.....	Near Bigfork
Whitefish Lake.....	Near Whitefish
Crystal Lake.....	Between Kalispell & Libby
McGregor Lake.....	Between Kalispell & Libby
Middle Thompson Lake.....	Between Kalispell & Libby
Bull Lake.....	Near Troy

Spar Lake.....	Near Troy
Glen Lake.....	Near Eureka
Dickey Lake.....	Near Trego
Holland Lake.....	Near town of Seeley Lake
Lindberg Lake.....	Near town of Seeley Lake
Placid Lake.....	Near town of Seeley Lake
Salmon Lake.....	Near town of Seeley Lake
Seeley Lake.....	Near town of Seeley Lake
Lake Francis.....	Near Valier

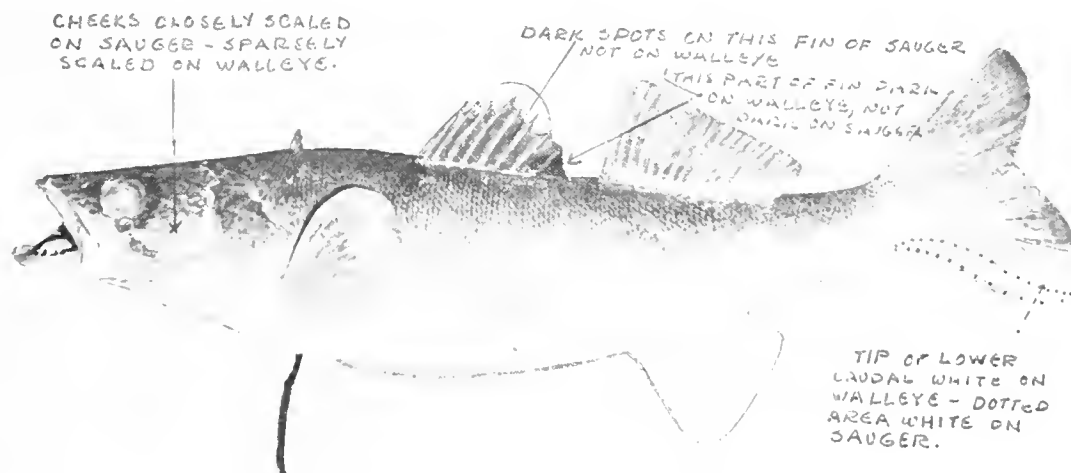
Southwestern Montana

Georgetown Lake.....	Near Anaconda
Harrison Lake.....	Near Harrison
Daily Lake.....	Near Emigrant

Central Montana

Ackley Lake.....	Near Hobson
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SAUGER (*Stizostedion canadense*) and **WALLEYE** (*Stizostedion vitreum vitreum*), both sauger and walleye are sometimes referred to simply as "pike." This causes some confusion as they are not in the pike family.



Sauger and walleye are similar in appearance and are both members of the perch family. Walleye, the largest member of the family, grow to three feet long in some U.S. waters. Sauger only reach half this length. In addition to growing larger than perch, sauger and walleye differ from perch in having canine teeth (unusually long teeth) and more elongated bodies.

The color of sauger and walleye is variable and hard to describe. In general, sauger have brassy or orange sides whereas the sides of a walleye are more olive-yellow. Both have dark mottlings on back and sides. On sauger these are concentrated into more distinct blotches. The best external characters for distinguishing Montana sauger from walleye are shown in accompanying illustration.

Adult sauger and walleye eat mainly fish. They spawn in the early spring and have similar spawning habits. They do not built a nest but broadcast their eggs, usually over a rocky bottom, in shallow areas of streams or lakes.

The native range of both is in rivers and lakes east of the Continental Divide. Sauger were originally found from Vermont to Tennessee and Arkansas and northward to Montana and southern Canada. Walleye are native from the Tennessee River Drainage northward into Canada. In the U.S. their range did not extent as far west as Wyoming and Montana. However, in Canada it spread northwestward to Great Slave Lake. Walleye are primarily a lake species. They have been planted in various waters in eastern Montana and in some places have hybridized with sauger.

SAUGER AND WALLEYE WATERS

Central and Northcentral Montana

Missouri River and main tributaries
(sauger and some walleye)

.....Morony Dam to Fort Peck Reservoir

Hauser and Holter Reservoirs &

Lake Helena (sparse walleye
populations).....Near Helena

Marias River (sauger and
some walleye).....Below Tiber Dam

Fresno Reservoir (walleye).....Near Havre

Milk River (sauger and
walleye).....Below Fresno Dam

Petrolia Reservoir (sparse
walleye population).....Near Winnett

Northeastern Montana

Fort Peck Reservoir (good
sauger and sparse walleye
populations).....Near town of Fort Peck

Missouri River (good sauger population,
some walleye).....Below Fort Peck Dam

Nelson Reservoir (excellent
walleye population).....Near Malta

Poplar River (walleye
and sauger).....Near Mouth

Johnson's Reservoir (walleye).....Near Lindsay

South Fork Reservoir (walleye).....Near Terry

Several small reservoirs in northeastern Mon-
tana have walleye.

Southeastern Montana

Tongue River (sauger)..12-Mile Dam to Mouth

Yellowstone River (sauger and walleye)

.....Huntley Dam to North Dakota border

Yellowtail Reservoir and

Afterbay (walleye).....Near St. Xavier

Big Horn River (sauger and
walleye).....Yellowtail Dam to Mouth

Several small reservoirs in southeastern Mon-
tana have walleye.

A River Fights Back

By LITER SPENCE

The products of a river's work are not without purpose. Yet too often men forget, or do not realize that a pool, a riffle, or a gravel bar are a necessary part of a stream's character. This was graphically portrayed in an incident which occurred on the Bitterroot River beginning the fall of 1966.

Highway construction between Missoula and Lolo necessitated relocation of a portion of the Northern Pacific Railway along the Bitterroot River. This entailed filling in the west bank of the river to accommodate a new railroad alignment. The Northern Pacific Railway served notice that it would require the opposite (east) bank of the river to be modified. This modification was in the form of dredging out approximately 1,500 feet of river channel and removal of about 42,000 cubic yards of a gravel bar. The reason given for this work was that because of the encroachment into the west side of the river, additional space was required on the opposite side to allow passage of high water.

The Fish and Game Department felt that since the relocated railroad grade would be heavily armored against the river by large rock riprap, any additional space needed by the river during high water should be made by natural erosion of the river itself. Also it was felt that the river would simply re-

deposit material into the excavated area by its natural erosion and deposition processes. However, negotiations with the Northern Pacific failed to produce favorable results and in December 1966 removal of the gravel bar began.

The accompanying photographs show the physical alteration and natural restoration of the Bitterroot River channel under discussion. In only a few months the river had replaced much of its gravel bar. Evident is the fact that a substantial portion of the channel was unnecessarily destroyed. The river redeposited gravel and sand into the excavated area, thus nullifying much of the original work. Not only was there damage to fish habitat but the results of the project were generally ineffective (and costly).

This round was won by the Bitterroot River. Hopefully, there will not be a necessity for further rounds on other Montana streams. One great aid in preventing such stream alterations is Montana's Stream Preservation Law. Since 1963 this law has required that agencies of the state and local governments notify the Fish and Game Department of any construction project which would influence the physical nature of fishing waters. The law does not include alterations done by private landowners, corporations, or federal agencies.

Gravel bar as it appeared at the initial stage of removal in December 1966. Undisturbed portions can be seen along water's edge.



Removing the gravel bar. The spoil area for the excavated material is behind row of trees. February 1967.



Completed physical alteration as it appeared in late February 1967, prior to spring high water. Dredging was done from the lone pine tree on left to the point where dragline is located.



River channel as it appeared in August 1967, following high water. Recurrence of gravel bar is evident.



Elk Teeth as Ornaments

By KEN GREER

Modern man has perpetuated at least one of the early Indian customs—the use of elk teeth as ornaments. Beautiful jewelry fashioned from the ivory-like teeth is exemplified by these earrings, necklace and bracelet. Earrings and bracelet are teeth of bull elk and necklace are teeth of cow elk.

Photo—Courtesy of Doris Whithorn of the "Wan-I-Gan" near Pray, Montana



The greatly modified canine teeth of elephants and walrus, known commonly as tusks, have for centuries been prizes for their ornamental value. In our own vicinity, elk are the main suppliers of teeth which are prized for their ornamental beauty. These are also upper canine teeth with ivory-like texture. They are known by various names, including "Whistler Teeth, Bugler Teeth, and Ivory Teeth." As the animals grow older, the exposed portions of the teeth become colored with various shades of rich brown. The stains are from the foods that the elk eat.

Just when American Indians began to include elk teeth among the decorative trinkets is not precisely known. Rudolph Friederich Kurz, adventurer and artist, in his journals of 1846-1852, reckoned that the practice had originated among the Crow Indians. He states, "Among the Crow Indians originated the singular style of trimming, for women doeskin garments, with rows on rows of elk's teeth placed horizontally across front and back." Kurz and others, however, made reference specifically that it was the lower incisors which were used. It seems probable that the use of canine teeth made garments even more valuable.

Value of elk teeth for use on garments is mentioned in the 46th annual report from the Bureau of American Ethnology. It states "Ten ermine skins will also bring a horse among the Crow Indians, and 100 elk teeth are worth as much, there being but two teeth in each elk which are suitable and the tail feathers of the war eagle are the only ones used. The elk are not killed in great numbers by any one hunter, so that much time and bargaining are required for an individual to collect 300, the number usually wrought on a Crow woman's dress." From this report also, mention is made that the skins of elk were used for clothing and though the meat was eaten, the Indians didn't especially relish it.

Further mention of value comes from the Heye Foundation, New York Museum of American Indians. "At that time (1854) the common summer dress of Crow women was of blue or green cloth and was valued at only \$6.00. But a fancy summer dress 'a fine white bighorn skin cotillion adorned with 300 elk teeth', was worth 25 buffalo robes or \$75.00.

"It was not the basic material but the pro-



Key chain decorated by the tooth of a cow elk.
Photo—Courtesy of the "Wan-I-Gan"



The pendant, beautifully mounted in engraved gold, is from Europe and contains the upper canine teeth of red deer. The European red deer are closely related to the wapiti (elk) of North America.

fusion of elk teeth employed in the decoration of these fancy dresses that made them so valuable. . . ."

The authentic Indian bridal ceremonial gown pictured here had the most extensive collection of elk teeth of several gowns examined. This gown is on exhibit at the McGill's Museum on the Montana State University Campus and is owned by Mrs. Palffy of Bozeman. Handling of the garment showed it to be very heavy. Scales were obtained and it weighed nearly seven pounds. About 740 teeth had been used for decoration; however, examination showed every tooth to be a hand-carved facsimile, each carved from

bone. Further research showed that by the latter 1800's, carved imitation elk teeth used on Indian dress had largely replaced the use of genuine teeth.

At the turn of the century, the national organization of Elk's lodges used elk teeth, heads and antlers as emblems for the fraternity. Individual members signified their membership and association with this lodge by wearing elk teeth on their watch fobs or watch chains. A demand for these teeth prompted inflationary prices for the raw teeth. This created a flourishing period to make the most of an opportunity, and many elk were reported killed just for the teeth. Public dissent of these actions resulted in regulations prohibiting this activity and with laws available to enforcement personnel the indiscriminate and exhaustive killing of animals and birds for professional trophy practices was curtailed and eventually abolished.

William Rush wrote in "The Big Horn," September 1927: "However, for several years covering the period of 1912 to 1918 elk tusks were in great demand as sets for various pieces of jewelry and high prices were paid for the choicest specimens. Very large mature bulls' tusks have been known to sell for as high as fifty dollars while ten to twenty-five dollars was a very common price, the size, shape and coloring determining the value.

Unprincipled renegades in the country where elk were numerous soon got to killing elk for their tusks, shooting the animals down, extracting the ivories and leaving the remainder of the animal to spoil and be devoured by the coyotes and ravens. It hardly seems possible today, that ten years ago it was a common thing in the elk country to find a number of huge bulls lying dead on the hillsides, a bullet hole through their shoulders and their ivory tusks extracted. Yet the State and Governmental authorities were forced to put a dozen or more armed wardens and rangers in the Yellowstone River valley north of Yellowstone Park to stop this practice. It is hard indeed to realize that a white man would kill a magnificent wild animal for a paltry ten dollars, wasting six to seven hundred pounds of meat. Yet in the winter of 1915-16 the known kill for tusks was over 500 head, mostly large bulls."

Many persons still consider the canine teeth



Miss Jean Thelan, Montana State University coed, models Indian bridal gown decorated with simulated elk teeth. Elk teeth carefully carved from bone and polished. Insert shows how teeth drilled and fashioned to the garment.

of elk as trophies and display them for evidence of their successful hunting adventure. While some of us may appreciate the artistic beauty of an organic tissue such as a tooth, many may overlook or ignore the fact.

Various methods have been devised to exhibit or display these teeth coveted by some hunters. Teeth have been designed and arranged for jacket buttons, watch fobs, bolo ties, stick pins, tie clasps and cuff links. For women not having reservations about the



an authentic elk
tooth has been
the teeth were



Top) Tie clasps—tooth on chain clasp is from bull elk, perhaps eight to ten years old. Tie clip—teeth probably from different elk 10 to 15 years old. Tie-tac—male elk tooth, three to four years old.

Photo—Courtesy of the "Wan-I-Gan"

Bolo tie decorated with crowns of teeth from six to eight year old cow elk mounted on a section of elk antlers. Tie belongs to Mr. Ken Greer of Bozeman, Montana.

origin of the object, assorted arrangements of earrings, necklaces, pendants, pins and bracelets were created.

Just as antlers have been cut, designed and

assembled for useful purposes and artistic creations—elk teeth are quite novel and will probably always be considered as a keepsake or trophy to hunters and collectors.



WATER

Who Cares About It?

By FRANK H. DUNKLE, Director
Montana Fish & Game Department

(From a speech directed to the
Montana Water Development Association)

We care about water!

Our interest in water and its development is more than just a casual one. While at times we find our image is one of an agency of preservationists and negative thinkers in the field of water resource development, a close look at the record will reveal a few facts that contradict that image. For example, I'm sure you know that in the last ten years, the Fish and Game Department has built more dams, created more reservoirs, than **any** other state agency. We have, in fact, built more dams than **all** other state agencies over the last ten years.

In addition to building dams by ourselves, we have contributed (and I mean cold, hard cash— not just moral support) to many other reservoir construction projects. Whenever our department was able, we have invested cold, hard cash in the development of Montana's water resource. We contributed because we **do** care about water.

Besides constructing all the reservoirs we can, we make annual expenditures in the fishery management of reservoirs and for research relative to the fishery management of reservoirs. Whether we constructed the reservoir or some other agency built it, we do our best to understand its biology. Whether we initially supported the project, or on the rare occasion when we violently opposed a project, we have always done our best to enhance the recreational value of the resultant reservoir. This costs money and we willingly make these expenditures because we care about water and the public's enjoyment of it.

While much of our department's effort is expended in the area of water resource development we are, after all, the Fish and Game Department; so, let's look for a moment at how our interests and yours fit together at times and, unfortunately, conflict at times.

It is probably no longer a debatable point that fish are dependent upon water, so the relationship between water development and fisheries is well established.

There are a variety of fish in Montana. These different fish are keyed to various types of water—lakes, large rivers, streams, and some creeks. The lakes can be broken into large, natural lakes, large and small reservoirs; and high mountain lakes. Montana is blessed with rivers and streams that represent the whole spectrum of free-flowing water, from crystal-clear, sparkling freshets in western Montana to the slow-moving, silt-laden streams of eastern Montana. Each of the various types of water have different fish communities and represent different types of fishing recreation; fishing that, again, ranges from the delicate dry fly placed at just the right spot, to sitting comfortably in a boat trolling along—or, to the snagging of the ancient, almost prehistoric, paddlefish.

Herein lies our problem, gentlemen, in water development. If a project includes the development of a reservoir that changes the whole personality of the water, it also changes the whole management approach. Yes, sometimes it even drastically changes the type of fish that can be expected to survive in the area. No project in Montana has yet been constructed that eventually has not become our problem to provide a fishery and other recreational opportunities.

View for a minute this problem from my eyes and the eyes of the sportsmen. First of all, these projects were built with your tax money and mine. Then, there was no consideration for the fish, wildlife, and recreational interests when the project was set under way. In addition to this, no money was provided from taxes, or otherwise, to bring a new management program to the water or to develop a fishery. How would you like to be under the gun?

Understanding, cooperation, and unity of effort could have solved many of these problems and brought considerable additional benefits to Montanans.

While there are in the neighborhood of seventy-five species of fish in this state, anglers in central and western Montana are not only interested in trout, but demand trout; and our state's ability to satisfy Montanans and attract out-of-state guests depends on maintaining a trout fishery. There are perhaps some who would choose to question or argue the last statement concerning nonresident guests coming to fish but I think, in general, most Montanans are willing to accept the recreation industry as a legitimate use of our resource. At any rate, the major portion of our recreational fishing resource will depend on our ability to supply quality trout fishing. Surveys indicate our greatest asset in attracting fishermen is Montana's trout streams. Consequently, our major task is providing streams that will produce trout for

residents and nonresidents alike. There is no other state in the nation that can compete with our existing and potential trout stream fisheries.

Emotions cannot be the dominating factor in water development. We in the recreational field have some solid, practical recommendations to make on development projects. This is no time to try to go into detail. Given the opportunity, I feel strongly that our recommendations can be worked into any project—at a significant advantage to the total project—and at a minimum cost.

Practicality starts with mutual recognition of the other fellow's problem and an honest, straightforward approach to solve the problem in the best interests of all parties.

If you will permit, I will take the liberty of trying to sum up the position of most other individuals actively engaged in water resource development. You are primarily interested in storing water; diverting it to crop land or an industrial process; and then getting rid of it. We would be kidding one another if we pretended that there was no conflict between our interests; there obviously is. Perhaps there will always be, but perhaps there are ways that we can help one another. No one will deny that in the past we have quarreled and argued, and in some specific areas we are in disagreement today. I think that is because we have chosen to deal with one another only when we absolutely had to, and this has always been when your interest, or our interest was being hurt.

Anyone who has raised a family knows that brothers will occasionally feud. We are brothers in a family of conservationists trying to make Montana a better, more prosperous place to live. We are not together over how this should be done. Family people also know that the quickest way to unite brothers and to direct their joint energies toward a common foe is for a third party to interfere or to try to capitalize on the quarrel. There are lots of third parties circling Montana like a flock of vultures and the carcass they want to pick is our water.

I don't think agriculture, or more specifically irrigated agriculture, alone can hold the line. I don't think industry alone can secure our right to all of Montana's water. I know that recreation, fish and wildlife alone cannot maintain Montana's claim to all its water. We don't even represent a legally beneficial use in this state, and I predict we will see this fight either together or alone through the federal courts where legal recognition will take on a lot more importance. I don't think any single or limited interest coalition is going to adequately preserve Montana's right to its water. The



Recreation is one of the few water uses which neither consumes water nor affects water quality.

job will be tough enough if we all pull together.

Pull together with the fish, wildlife, and recreation interests—for what? What can they do for us? How can they help?

On October 19th of this year (1967), the Great Falls Tribune reported the findings of a presidential commission which contained the following, "A presidential commission report expected to become accepted policy recommends that water institutions and water rights be changed where necessary to allow the water to move to its highest and best use. 'Highest and best' use would be determined by the national interest."

Perhaps fish, wildlife, and recreation interests can be of most help when we have to account to a thirsty neighboring region for the use to which we are putting our water. I hope at that time we can point to a recreation industry of national and great economic significance that is based on Montana water moving through the state in natural, unaltered water courses—not water used solely for fish and wildlife, but water that fish and wildlife can also use because other interests have returned it in a condition that still supports game fish. This could be water used by industry but returned cool and clear—or water used by agriculture but returned silt free—or water stored in a reservoir that both supplies irrigation ditches and also keeps streams alive

twelve months a year. In other words, we could have a variety of uses that complement one another, rather than compete with each other and gain always at the expense of one over the other.

This kind of dreaming and talking cooperation is easy. When it is over we can yawn, get up and stretch, and all go home or back to the same old battles. That's usually what happens, unless we resolve to take a different approach. Let's pass a new kind of resolution. Let's set aside, if only temporarily, what we are being led to believe is our top priority battle, and conduct an experiment in what your invitation termed, "Montana unity of effort."

Now is the time to begin a true working relationship based on a proper state-wide water use program that gives consideration to all water uses—a state program that considers all needs for state projects under discussion, as well as those for federal projects.

There are at least three steps here, as I see it, for all interest groups to face up to:

1. All legitimate water uses must be given legal recognition as beneficial uses of Montana's water. I am not thinking just of Fish and Game—I am thinking of all water uses. To do this, it will be necessary for all of us to support this philosophy—this theory—and see that it becomes a fact. Here is the very basis of state-wide water planning.

2. A state-wide plan must be developed that shows Montana's intent to, first, recognize the needs for her water and, second, to show that this water is being properly utilized. I purposely left the term "development" out. This term is probably the keystone to dissension among water use groups because it has never been adequately defined to the understanding of all of us. Development of the water resource may be a structure—it may be a series of structures—it may be no structures at all. Without setting down on paper our recognition of our needs and uses for water, we will be prey to all other water users outside of Montana. In addition to this, many interest groups within Montana will be excluded and unrecognized.

3. The final step, then, after the recognition of uses and planning for the needs is an open discussion of each project that may be considered. I don't feel that each project can be all things to all interest groups; however, it has been demonstrated in Montana that most interests can be served if we are working toward one goal—that is, unity of effort to properly protect Montana's water for Montana's users first. I don't mean to imply that we begrudge our water to our neighbors, but we do begrudge their using it before we have a chance to use this water to serve Montana's needs.

What am I driving at? I have been talking for some time now and still haven't mentioned those fighting words. Let me put you all at ease—Sun River, Castle Reef, and Lowry. I might have concluded, after looking at the program, that I was invited here to stimulate and perpetuate the Sun River "fracas," rather than to take the first step toward "Montana unity of effort."

Let me suggest, as an experiment in unity of effort and as a means for your organizations and mine to get used to working with one another, that we select and concentrate on a project where all of us might benefit. Let's work together supporting a project

where irrigated agriculture, fish, wildlife, and recreation could be served. Instead of spending our time telling each other, for the benefit of the world in general, that one of us is willing to compromise the Sun River dispute with the Castle Reef dam and that another is also willing to compromise but at the Lowry site—let's tell the world that **we** have decided to concentrate on a couple of projects that could benefit both our interests.

To begin with, we can provide a dam on the lower Sun River to give additional flood protection to Great Falls, plus providing recreational opportunities for people of the area. Then, together, let's support a proper project to rebuild the old, inadequate canal system that carries the water from Gibson Reservoir to the present water users. With such a re-vamping of the canals, more water will be available and additional lands in the area can come under irrigation.

Another project is the Marias-Milk transfer of water. It's no secret that irrigated agriculture in the Milk River Valley is usually short of water. Fish suffer in Fresno Reservoir from extreme water level fluctuations. The Marias below Tiber could be a better fishery with a sustained flow, rather than the extreme high and low flows it is now subject to. There are also some potential waterfowl development sites between Tiber and Fresno that need water.

There are problems, too, not the least of which is the potential introduction of carp into Fresno and, subsequently, Alberta, Canada—but no project is without its problems. I believe we can solve our problems and support these projects if fish and wildlife can be made a part of the field studies currently being conducted.

I'm for having a "go" at a real concrete attempt to achieve this unity of effort that is so easy to talk about, but so difficult to accomplish. We have to start getting together because you care about water, and I care about water.

THE SHAGGY ONES

By VERN CRAIG

Besides the huge mass of the animals, two other features of buffalo are most striking at first acquaintance—the pig-like grunts and those wild little eyes which seem almost too small for such a large shaggy head. The huge head is made to look even larger by a woolly growth of long hair that almost hides its ears. Hair of the head grows 10 to 14 inches long. The visage is set off by a distinctive beard, eight to 10 inches long, which is kept worn by grazing and rubbing, especially during the rut.

Ancestry

Though he has been called “buffalo” since pioneer days, this big grasseater is no relation to the buffalo of Asia, of Africa, or of the variety of domestic water buffalo in the Philippines. Neither is there any evidence that he is a descendent of the great “superbison” of the American Tertiary period. The bison, as he is more properly called, apparently migrated to North America in the middle-Pleistocene during the warm periods between invasions of great glaciers that scoured the continent. Cousin to the American bison is the Wisent, once common in Europe. Today, there are only a handful of Wisents remaining, and those are in captivity.

Former Range

When Europeans came to North America, bison ranged over about a third of the continent. The vast range extended from Canada's Great Slave Lake to old Mexico, from the Blue Mountains in Oregon and the Sierra Nevadas in the southwest, eastward to New York and the Carolinas. “Their bones have been found with those of mountain sheep on mountain summits where horses could not find a footing and which man could reach only by climbing.”

Three races of buffalo have been generally recognized: the wood bison; plains bison, and the diminutive mountain bison. It is accepted that the three have common ancestry but have gained physical differences through long habitation of different environments.

Former Numbers

Just how many of these shaggy brutes roamed the mountains, prairies, and muskegs will never be known. Possibly peak numbers had been reached even before discovery of America. Ernest Thomas Seton estimated that there may have been 60 million about 1800. Other estimates place them at 40 million in 1830, 5½ million by 1870-1871, and by 1900,

less than 300 wild bison were known to exist in North America.

Their Passing

It is not our purpose here to bemoan the passing of buffalo. They were not compatible with whiteman's civilization and were destined to ultimate destruction in one way or another. It is interesting, though, to muse the finale of this great era. A talk by 85-year-old B. F. Lamb at the Laurel Rotary Club in 1943 gave the following eye-witness account



of the last great herds in Montana. "I have nothing to tell but what I saw and can remember, and it is a long time since I gave much thought to it.

"It is about the passing of the buffalo. It is as I saw it. It takes me back to the early eighties and the scene is on the north side of the Yellowstone River near Miles City . . .

"At that time the country was not settled, and that year (1880), vast herds of buffalo drifted in to take the place of other kinds of game such as antelope, deer, elk, and some straggling bands of buffalo that were on the range then. Anywhere from five to ten miles from the Yellowstone River you could look in any direction and see buffalo on every hill, ridge and valley as far as the eye could reach. You could see millions at one time.

"If one had not seen it, it would be almost unbelievable. But they were there and were gone in the course of one year. The last clean-up of the herd was on the prairie south of Dickinson in North Dakota."

Usher L. Burdick in his account of George Newton, a buffalo skinner, gives another picture of the buffalo in Montana.

"Newton started out with this firm (Frazier) with a salary of \$50.00 per month, and was considered one of the best skinner in the West. An ordinary skinner would skin 12 animals per day and a top-notch would skin as many as 30, and Mr. Newton made the record run of 30 on several occasions. A record of 30 was by no means the top record of the West. In the winter of 1878-1879 the firm of Frazier Brothers killed 5,000 buffalo and these were skinned by a crew of six men.

"It is estimated by Newton that in the winter of 1879-1880, 150,000 buffalo were killed along the Yellowstone from the Big Horn Mountains to where Sidney, Montana is now located . . .

"A prime robe was worth \$4.00, which was not obtained from the largest animal, for regular bull hides were worth only \$2.75, and calf hides, \$1.75. A prime robe was usually of finer texture and came from buffalo cows or a spike . . .

"In the winter of 1880-1881, George Newton went to work for himself in the buffalo business and had as his partner John Herbert, afterward policeman at Bismarck, North Dakota. In the winter of 1880-1881, this new firm



A buffalo hunter's winter field quarters.
Photo—Courtesy of Montana Historical Society



Taking buffalo tongues.
Photo—Courtesy Montana Historical Society

killed 1,300 buffalo. In the winter of 1881-1882 they operated along the Little Dry.

"In 1882-1883, a great calamity came over the business of the buffalo hunter. Great preparations were made by the supply dealers along the Big Dry, Little Dry, and Frazer Creek to have a large quantity of ammunition and food in readiness for the hunters. Mr. Newton estimated that during the winter of 1882-1883, a thousand hunters were on hand to meet the great herds of buffalo as they would make their return from Canada, according to their custom . . ." The buffalo never returned.



A buffalo wallow currently being used at Moiese Buffalo Range.

"The buffalo had disappeared like magic. Traders removed their goods, closed their books, and left the country. Hunters deserted the chase and after recovery from the shock incident to the magic disappearance of the buffalo, they wandered into other pursuits."

Size

One account gives the size of a five or six year old buffalo bull from 5½ to 6 feet high and from 9 to 12½ feet long, measured from nose to tip of tail. Average weight is listed between 1800 and 2,000 pounds, although there is a record of a Kansas bull which weighed 3,000 pounds. The cow is much smaller, weighing around 800 pounds, with a height of about five feet and length of about seven feet from nose to tip of tail. Joe Mazzone, manager of the National Bison Range at Moiese, Montana, said that their adult bulls average 1,700-1,800 pounds in October, and 1,800 to 2,000 pounds is a good figure for spring and early summer weights. Cows from four to six years old have weighed 930-970 pounds. Cows, seven and over, average 1,000 pounds or more.

Buffalo may live 25 to 30 years. It is stated that "Despite their great size and bulkiness, buffalo can wheel and charge quickly. They have amazing mobility, speed, and agility; in deep snow they can out-distance a man on snowshoes; in powdery snow they can outrun a dog team."

Rubbing and Wallowing

The Plains bison liked open country, moving about in small bands which mingled to

form the large herds. In the spring the heavy winter coats were shed, accompanied by a great deal of rubbing by the itching and bedraggled-looking animals. Pioneers and buffalo hunters told of the highly polished rubbing stones found on the prairies, of toppled telegraph poles, and of trees literally stripped of bark by the animals.

The buffalo wallow was also a common sight on western plains. With horn and hoof, the bison dug up the earth. These areas or wallows, the animals use to roll in. The wallows become basin-shaped and may be a foot or more deep and up to 15 feet across. Accounts state that the buffalo wallows in frontier days would hold the rain waters. Water on the prairies was often precious and wallows often served as water holes for both men and horses. There are still Montanans who can remember plowing buffalo wallows under with virgin sod. The wallows were generally distinguishable both by the depressions and by supporting a different type of vegetation than surrounding, undisturbed land.

Mating

Buffalo calves are born in April or May after a gestation period of about 9½ months. The mating season takes place around July or August, peaking about mid-August at the Moiese Bison Range. Bulls become nervous, irritable, belligerent and bellow frequently. A buffalo herd can be dangerous and unpredictable at any time of year, but especially so

during the breeding season. It has been said that they may even be stampeded by the shadow of a cloud.

Albinos

As with other species of animals, there is an occasional white, or albino buffalo born. The Indians believed that the white animals belonged to the sun god and that they carried big medicine. Few were seen, and even in days of lots of buffalo they were a real rarity. One such albino, named "Big Medicine" was born in May of 1933 and lived on the National Bison Range at Moiese, Montana for 26 years. After death he was mounted and is now on display in the historical museum at Helena. Big Medicine sired a true albino son in 1937 that lived until 1949 in the National Zoological Gardens, Washington, D.C.

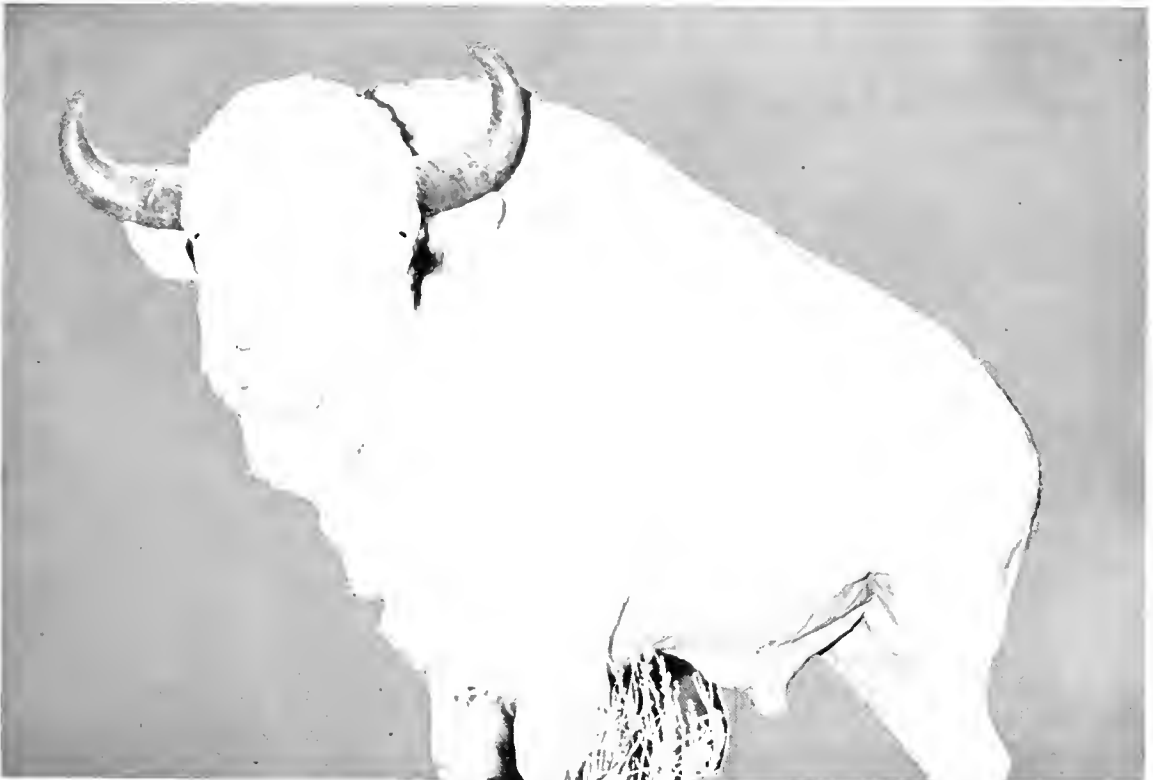
Last of Indian Drives

A method that Indians used for killing buffalo was the "drive" in which buffalo were stampeded over a cliff or into a corral built in some natural ravine or depression. Apparently, this type of hunt was pretty much abandoned when the Indians learned to use

horses. Still, some historians have found the "pishkun" in use up to between 1852 and 1857. They point out that the method was used at this late date among the northern Blackfoot Indians, considered to be among the poorest in horses.

The last buffalo drive in Montana, as carried down by Indian legend, may have been by a Piegan band called "Never Laughs." Lazy Boy, a Piegan Indian born about 1855, described what was probably the last buffalo drive in Montana. He did not personally remember the drive, but the story had been told to him many times as a child.

The "Never Laughs" were camped on the Teton River a few miles north of the site of Choteau. In the area they built, below a shallow cliff, a wooden corral. Lines of rocks, leading into a V over the corral were placed on the prairie above as a hiding place for Indians who would stampede the herd when it was in the proper place. After several unsuccessful attempts, one of the Indians, Many Tailfeathers, became angered, built a fire and burned the corral.



"Big Medicine"—an albino buffalo which lived at the Moiese Bison Range and is now on display at the Montana Historical Society Museum in Helena.

Years after this, in about 1872, the Blackfoot Indians made a drive west of Macleod, Alberta. As can best be determined, 33 bison were taken in this drive, and it may well have been the last one in North America.

Saving the Species

While the numbers of buffalo were rapidly shrinking, a few individuals were saving some of the stock for private herds. It wasn't until 1894, however, that the U.S. Government took positive steps toward saving the last scattered remnants. There were about 250 wild buffalo in Canada and 20 in the United States. The handful in the United States had retreated to the confines of Yellowstone National Park, but even they were in danger of being wiped out by poachers. In May 1894, Congress declared it illegal to hunt buffalo in Yellowstone Park.

The 250 wild buffalo left in Canada had been given protection in 1893. In 1922, an 11-million acre "Wood Buffalo National Park" was created in Canada to accommodate the growing herd. From 14,000 to 16,000 animals now range this vast park.

With funds raised by the National Bison Society, then under leadership of the famed naturalist Dr. William Hornaday, the 19,000 acre National Bison Range at Moiese, Montana was established in 1908. The land was purchased from the Flathead Indians. The beginnings of the herd which roam there, dates back much further, however.

In the year of 1873, or possibly 1874, a Pend d'Oreille Indian, Walking Coyote, with his stepson and squaw had been wintering east of the Rockies with the Piegan Indians on the Milk River. During a hunting expedition Walking Coyote captured four buffalo calves; or the calves followed him back to camp according to one account. Came spring and the calves were trailed to St. Ignatius Mission in the heart of the Flathead Reservation. Ten years later, Walking Coyote's bison herd had grown to 13 head and he decided to get rid of them. C. A. Allard, then ranching on the Flathead Reservation, talked his fellow rancher and friend, Michael Pablo, into a partnership to buy the buffalo at \$250.00 per head.

In 1893, Allard and Pablo bought 26 buffalo from "Buffalo Jones" of Omaha, Nebraska. The herd, totaling about 300 at the time of

Allard's death in 1896, was divided between Pablo and the estate of Allard. The 150 that went to the estate were divided among Mrs. Allard, her daughters and two sons. Mrs. Allard sold her share to Charles Conrad of Kalispell.

Thirty-four of the Conrad herd bison were eventually purchased to begin the bison herd at Moiese. Two other bison were donated from the Conrad herd, two were donated by Charles Goodnight of Goodnight, Texas, and three from the Blue Mountain Forest Association of New Hampshire were donated from the Calvin herd. The first buffaloes were released on the range Oct. 17, 1909.

Though the latest surveys show a total of some 20,000 to 22,000 bison in the United States and Canada, it would be quite a chore to determine just how many bison there are in the United States today. From three to five hundred are kept at the Moiese Bison Range. There are three other national bison ranges: Wichita Mountains Refuge in southwest Oklahoma; Fort Niobrara Refuge in northern Nebraska; and the Sullys Hill Refuge in northwestern North Dakota. Several national parks have buffalo, including Yellowstone Park, Grand Teton Park, Wyo., Wind Cave National Park, Wyo., and Colorado National Monument, Colo. There is a large herd in Custer State Park of South Dakota, and numerous animals owned by private individuals.



A mounted specimen of a mountain buffalo. This is one of three specimens on display at the McGill Museum, Montana State University, Bozeman.

A Common Parasite of Montana Whitefish

By LAWRENCE G. MITCHELL

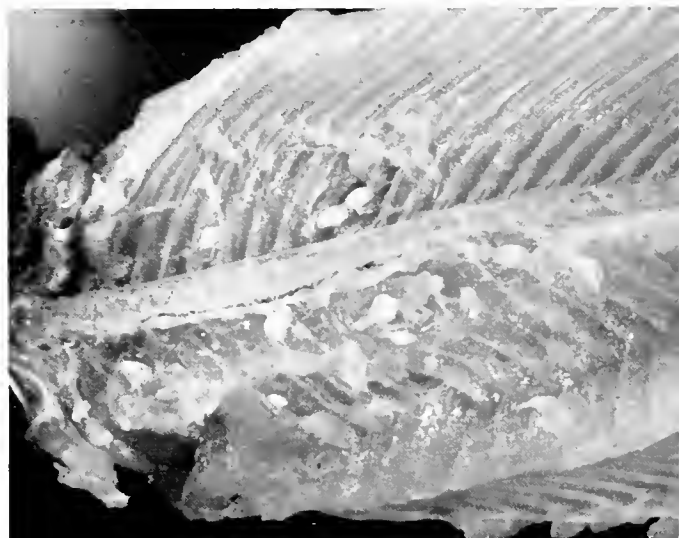
Dept. of Zoology
University of Montana

Many fishermen in western Montana have been concerned about small white lumps or sacs found commonly in the flesh of the mountain whitefish. These are cysts formed by a minute one-celled animal belonging to a group of fish parasites known as the Myxosporidea. The one found locally in whitefish is also found in other whitefish in Scandinavia, Europe, and Asia; its scientific name is *Henneguya zschokkei*. Members of this group have been given common names such as fish pox and boil disease. Many members of the group are able to infect only one species or group of closely related fish, and are therefore said to be host specific.

Henneguya zschokkei usually infects only whitefish although it has been found infecting certain trout and non-game fish in one lake in Russia. Cysts in mountain whitefish are creamy-white and may reach the size of a pea. They consist of a milky inner mass surrounded by a stiff envelope. The inner mass is made up of thousands of tiny units called spores.

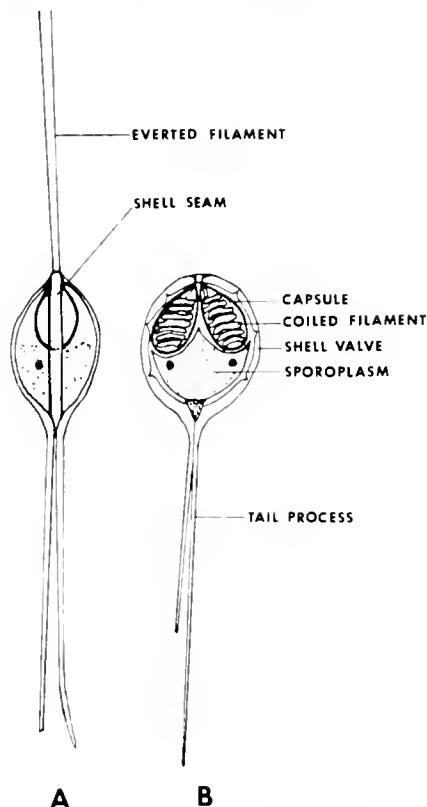
The life cycle of this parasite is only partially known. The white cysts rupture and release their spores with death and decomposition of whitefish. Spores may be carried by the water or sink to the bottom, but presumably they remain unchanged until they are eaten by another fish. Whitefish probably pick up spores accidentally while eating regular food organisms.

Once in the gut of a fish a spore hatches; its living portion, the sporoplasm, emerges, penetrates the intestine, and probably enters the blood stream. For unknown reasons, most of the Myxosporidea infect only certain tissues or organs. *Henneguya zschokkei* forms its cysts in the muscle of mountain whitefish. Each sporoplasm carried to the muscle starts dividing and eventually produces a large packet of spores. This packet is the cyst which is visible to the human eye. Since the cysts often occur in the muscle along the backbone,



Cysts of *Henneguya zschokkei* in muscle of mountain whitefish. Natural size.

Photo by William Morrelles



Side (A) and front (B) views of spore of *Henneguya zschokkei*. Enlarged approximately 1250 times.
—Original by author

fishermen may notice them while cleaning whitefish, but more can usually be seen when fish are skinned. Tail muscle is often most heavily infected.

The structure of the small (about 1/500th of an inch long) spores can only be seen with the aid of a microscope. Each spore (fig. 2) consists of a living portion (sporoplasm) contained in a shell which is made up of two equal parts called valves. Each valve of the shell has a long tail-like extension. The sporoplasm emerges to infect a new host when the shell valves separate along the seam shown in figure 2a. Also within the shell are two oval capsules, each containing a long coiled thread of filament. The filaments uncoil and protrude through holes in the shell when the sporoplasm hatches. The significance of this filament uncoiling is not known.

Henneguya zschokkei does not seem to fatally injure the mountain whitefish, but heavy infections may do considerable damage to the muscle tissues. It is not known how long the cysts stay in the muscles, and no cure is known for infected fish. It seems likely that the lake whitefish and pygmy whitefish also harbor this parasite, but these species have not yet been examined.

Myxosporideans are commonly seen on the gills of minnows and suckers in western Montana; they are also known to infect some amphibians and reptiles. Man has undoubtedly eaten cysts of these parasites many times, but as far as is known, none of the Myxosporidea are infective to him. Cooking kills the spores, but smoking probably has very little effect on them.

I am grateful to Mr. George Melder of Missoula for providing specimens.



Amplly wrapped in its protective covering and sheltered from the snow and wintry blasts of the frigid north wind, this hibernator maintains a temperature closely corresponding to its surroundings. Each year soon after the first sifting to earth of a dense cover of white flakes it can be found, lying dormant, in the same spot. A prairie dog you ask? Perhaps a chipmunk or a marmot? No, it is a camera

WINTER OUTDOORS . . .

By GERRY ATWELL, Wildlife Biologist,
Montana Cooperative Wildlife Research Unit

PHOTOS BY AUTHOR

—one of the many hundreds of thousands that will not be allowed outside man's thermo-regulated environment until next spring's balmy breezes beckon the photographer to capture a shot of Aunt Nagelworth's Easter bonnet.

Meanwhile, hoar frost periodically adorns bushes, branches, and the skeletons of last summer's knapweed and Hercules parsnip.



Coyote in defensive pose.

. . . and Wildlife Photography

Blue shadows change hues and shapes as the play of light shoots across the uneven snow cover. Deer and elk, congregated on their winter ranges, are silhouetted in a golden aura by the weak winter sun. Should not the camera be available to feed on such sights as these?

Modern man's affluence has afforded him the automobile, hand warmer, and down jacket, basic items which considerably simplify winter outdoor photography. Often it is not even necessary to leave the vehicle for pictures but for those individuals that do, a wonderful experience awaits them whether taking scenery shots, framing a skier, preserving wildlife on celluloid, or even immortalizing a family tobogganing party. These will be unusual pic-

tures—unusual in season, color, texture, and often subject matter. Where people are concerned, a carefree holiday atmosphere (such as exists when skiing, skating, sliding, snowshoeing, or bringing in the Christmas tree) will frequently pervade the scenes.

But wait, I have heard that many cameras will not function properly when the frost is on the pumpkin. The shutter sticks or is sluggish and the film advance sprocket often chews through the perforated film borders. True, there are problems, but where there are problems there are also solutions. The degree of coldness that cameras can be subjected to and still operate varies considerably between different makes and even between cameras of the same model. One of my 35mm's, when

exposed to the elements for long periods, works fine down to a few degrees above zero but another malfunctions if it is chilled to 27 or 28 degrees. Many people have heard about winterizing cameras. This is done largely for professional photographers who plan on using their equipment at extremely low temperatures, say from 10 to 40 degrees below zero, and where such an expenditure is adjudged part of their overhead. Most of us are concerned with cold weather photography in the temperature range from slightly above freezing down to around zero. In such temperatures a camera with a neck strap may be worn under a jacket, kept warm, and be available for action in a few seconds. An alternative is to carry the camera and spare film in a bulky pocket accompanied by a hand warmer. When the camera is kept warm by one of these methods it will function properly because the lubricants will not become viscous and the film will remain pliable.

When sporting a long telephoto lens its bulk will prohibit carrying the camera inside your jacket. If this happens it may be necessary to prefocus the lens and shoot only at the predetermined distance. This is because the barrels of many lenses cannot be turned easily once they have been in temperatures well below freezing for 15 or 20 minutes. In addition, under such circumstances one should remember to turn the film advance lever very slowly so not to rip the film between the sprocket holes. Another reason for this slow advance is to prevent static electricity from discharging within the camera and becoming an unwanted light source.

Camera bodies and metal accessories seem to be the coldest things on earth at 10 or 15 degrees above zero; however, a pair of silk gloves will help prevent the warmth from suddenly being sapped from your hands while changing film, making settings, or taking a meter reading. These gloves can be worn underneath mittens and with a mushroom-shaped, "soft-touch" attachment which screws into the cable release socket the shutter still can be fired easily, even with the most bulky mittens. When mittens are removed they either have to be stuffed into pockets or dropped onto the snow. To get around this a cord may be attached to the mittens and passed through the sleeves of a jacket kiddie-

style. When time is of the essence the mittens then can be quickly shed, yet are dangling almost at your finger tips when needed. Of course one way to cut down on removing mittens and flipping open the ol' box so often is to use 36 exposure rolls.

When setting the 'f' stop and shutter speed during cold weather take care not to breathe on your lens. To my knowledge ice scrapers of the proper size for camera lenses are not yet manufactured. A haze filter will not only be an asset for color shots but if fogged by breath, or snow adheres to it, the filter can easily be removed and cleaned. A yellow filter will perform the same function for black and white pictures. Filters that darken the sky well beyond what is natural should usually be avoided; the results overpower the picture, make it top heavy and take the interest away from the snow and main subject. However, you should experiment with this technique to determine what does and what does not suit your tastes.

Unless you are very familiar with winter light conditions and your film, it does not pay to estimate exposures. This is because winter sunlight is less intense for longer periods in the morning and late afternoon than summer light. Another enigma is that there are so many reflecting surfaces that dark objects have a tendency to be underexposed. Meter readings taken close to the main subject or to a similarly colored object will assist in correcting the problem. Be faithful in using a sunshade too, for it aids in screening undesirable peripheral light from the lens.

A snowscape presents a challenging opportunity to capture special effects of texture and detail; light and shade. Snow pictures should be simple. Delete the distracting elements and place emphasis on the snow itself. Learn what to leave out, such as brush, bare ground and rocks. For maximum effect the sun should be shining because without it the snow becomes dull and gray. If texture is to be emphasized, shoot against the light. Watch for "hot spots" on the snow that cause glare, particularly if the snow has a glazed surface from thawing and then freezing. Shadows often "make" a winter picture and they are changing constantly, depending on: amount of snow, time of day, lay of the land, lighting, and the angle from which they are viewed by the photog-



Frost scenes always make good subjects.



Boughs bend under the weight of Bohemian waxwings.



Big bull moose casts weird shadow as he plows deep snow.

rapher. To create a particular picture, take sufficient time to determine what is the most ideal marrying of these conditions and only then release the shutter.

Besides out-of-the-ordinary scenery and people pictures, interesting wildlife shots are also at your disposal during the snow season. Winter conditions concentrate many wildlife species and make them more available for the photographer. The animals usually radiate a healthy and vigorous appearance because of

their full pelages. Even birds puff out their feathers for added insulation and appear more rotund than normal. In some localities roads run through winter ranges of elk, deer, or moose and with the help of a medium-length telephoto lens excellent pictures may be taken from a car. The window, rolled halfway down and with a handkerchief as a cushion, makes a fine support. The animals often will not run as readily as they might at other times because the hunting seasons are closed, they are more used to seeing cars, and it is a task to move very far through deep snow.

If you want to fill more of the frame with the subject, soft snow is ideal for stalking wildlife. When the wind is right and there is adequate cover you may approach surprisingly close and yet be undetected. If subjects are not in sight their tracks may be and these can often times be followed until the animals are located. A white, knee-length army surplus parka is ideal for this sort of thing.

Sometimes the wildlife can be brought to you if you prefer. This may be accomplished by providing food, such as at a birdfeeder, or taking advantage of the remains of animals left over from the hunting season and carcasses of livestock discarded by ranchers. Coyotes, foxes, ravens, and magpies will feed at such spots for several days in a row and by dressing warmly and using a blind (maybe a small tent appropriately covered with sheets) the photographer has the chance to take pictures unobserved.

Use the snow to advantage and emphasize your subject with a white background whenever possible. Wildlife has a tendency to blend in with brush or trees so keep such masking elements to a minimum. A snowstorm

can add atmosphere to a shot of big game; a herd of bison for example. A slow shutter speed (1/50th of a second) will blur the falling snow and stress the severity of the storm.

By keeping both camera and film warm, 90 percent of your problems will be eliminated regardless of whether you attempt to take winter pictures of scenery, people, or wildlife. Of course, take pains to keep yourself comfortable too, so your efforts may be aimed at taking pictures and not doing deep knee bends. When walking it takes surprisingly little clothing to stay cozy but if standing still in the cramped confines of a blind for example, you may have to assume the aspects of a member of the Peary Expedition.

Upon returning home from an enjoyable winter's day in the field, chances are your equipment will be colder than the house into which you bring it. To prevent condensation the camera and lenses should be wrapped in a heavy coat or blanket so they may warm up gradually. If you neglect to do this and suddenly see moisture collecting on equipment set it in front of a fan until the moisture evaporates and the camera gear warms up. This is the poorer of the two methods, however, because the fan does not act on moisture that is inside the camera.

Although there are several things to remember while taking pictures during cold weather, the basic procedure is not complicated and differs very little from that practiced in other seasons. So with the above suggestions tailored to suit your particular needs, brush the moth flakes from your camera, zipper up that down jacket, bid a hearty welcome to the world of winter outdoor photography, and have yourself a SNOW BALL!

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